

**GROUNDWATER MANAGEMENT SYSTEM USING
HYDROGEOLOGICAL MODEL IN SG.KELANTAN
RIVER BASIN**

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**FACULTY OF SCIENCE
UNIVERSITY OF MALAYA
KUALA LUMPUR**

2011

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**DISSERTATION SUBMITTED IN FULFILLMENT OF
THE REQUIREMENT FOR THE DEGREE OF
MASTER OF SCIENCE**

**DEPARTMENT OF GEOLOGY
FACULTY OF SCIENCE
UNIVERSITY OF MALAYA
KUALA LUMPUR**

2011

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ABSTRACT

The groundwater resources of the Sg.Kelantan river basin are the main sources of fresh water and also are vitally needed to supplement surface water sources. However, despite their importance, the groundwater resources are under stress of exploitation and contamination. The maintenance and protection of groundwater ecosystems should therefore be a major topic in the coming years in groundwater water management. The main objectives of this study are to better understand the importance of a balanced development of groundwater as to preservation of good ecosystems in Kelantan by establishment of “Groundwater Resource Management (GWRM)” system, a decision support tool with GIS and database system to handle and store all water resource relevant information, and to establish a monitoring system with observation wells for level and quality of groundwater by evaluation of all existing use of water and redefine sustainable use and regulate rate of abstraction. Groundwater flow modeling of the alluvial aquifer is needed to support the sustainable groundwater management. Groundwater sources will be better managed and future development plans for groundwater will be fully controlled within the limits for a safe and sustainable environment, with following activity plan, i.e:-

- a) Groundwater survey, groundwater model, test drilling and pumping, and water sample analyzing in order to establishing “Groundwater Resource Management

(GWRM)” system with support of GIS and database system to handle and store all water resource relevant information,

- b) Evaluate all existing use of water and redefine sustainable use and regulate rate of abstraction, and
- c) Establish a monitoring system with observation wells for level and quality of water.

A validated groundwater flow model was created for a groundwater sub-basin within the north Kelantan regional groundwater basin to support the water resources management in the Kelantan State. Future development of groundwater can be guided by implementation of GWRM system and functions to safeguard any further contamination in a regional basis. This can benefits water operators and water stakeholders in understanding and managing the groundwater resources in the study area particularly.

ABSTRAK

Sumber air tanah daripada lembangan sungai Kelantan merupakan sumber utama air tawar dan juga adalah amat diperlukan untuk menambah sumber air permukaan. Walau bagaimanapun, walaupun kepentingan air tanah itu tidak boleh dinafikan, sumber air tanah adalah di bawah tekanan pengeksploitasian dan pencemaran. Penyenggaraan dan perlindungan ekosistem air tanah itu harus menjadi topik utama pada tahun-tahun akan datang dalam pengurusan air tanah. Objektif utama kajian ini adalah untuk lebih memahami kepentingan pembangunan yang seimbang air tanah untuk pemeliharaan ekosistem yang baik di Kelantan dengan pembentukan “Sistem Pengurusan Sumber Tanah (GWRM)” iaitu sistem sokongan pengurusan, dengan penggunaan GIS dan sistem pangkalan data, untuk mengendalikan dan menyimpan semua maklumat sumber air yang berkaitan, dan untuk mewujudkan satu sistem pemantauan dengan telaga pemerhatian bagi kualiti air tanah. Penilaian akan dibuat keatas penggunaan air sedia ada dan mentakrif semula penggunaan mampan dan mengawal selia kadar pengekstrakan. Pemodelan aliran air tanah di akuifer aluvium diperlukan untuk menyokong pengurusan air tanah yang mampan. Natijahnya, perancangan pembangunan sumber air tanah akan lebih berjaya dan di masa depan penggunaan air tanah akan dikawal sepenuhnya dalam had untuk persekitaran yang selamat dan mampan, dengan rancangan aktiviti berikut, iaitu: -

- a) Kajian Tanah, pemodelan air bawah tanah, penggerudian dan ujian pam, dan menganalisis sampel air untuk mewujudkan Sistem "Pengurusan Sumber Tanah (GWRM)" dengan sokongan GIS dan sistem pangkalan data untuk mengendalikan dan menyimpan semua maklumat berkaitan sumber air,
- b) Menilai semua penggunaan air sedia ada dan mentakrifkan semula jumlah penggunaan mampan dan mengawal selia kadar pengekstrakan, dan
- c) Mewujudkan sistem pemantauan dengan telaga pemerhatian untuk tahap kualiti air.

Satu model aliran air tanah telah berjaya diwujudkan dan disahkan untuk aliran air tanah sub-lembangan serantau Kelantan Utara bagi menyokong pengurusan sumber air di Negeri Kelantan. Pembangunan masa depan air tanah boleh dipandu dengan pelaksanaan sistem GWRM dan berfungsi untuk melindungi pencemaran di wilayah Kelantan Utara. Ini boleh dimanfaatkan oleh pengendali operasi bekalan air dan golongan berkepentingan dalam memahami dan menguruskan sumber air bawah tanah di kawasan kajian terutamanya.

ACKNOWLEDGEMENTS

Firstly, I would like to acknowledge the Almighty Allah SWT for His guidance and Wisdom throughout the process of this study. I am grateful to Allah SWT Almighty with overflow of good health and opportunities given by Him. I would like to take this opportunity to thank Associate Prof. Dr. Ismail bin Yusoff (Programme Coordinator of Geology Department) and Dr. Rosmadi bin Fauzi (Senior Lecturer of Geography Department) for their support and suggestions in preparing this thesis. Their valuable professional contribution and continuous encouragements have helped tremendously in opening my minds to hydrogeology environment and its studies about eco-systems. My sincere thanks go to all my course mates and members of the staff of the Geology Department, UM, who helped me in many ways and made the lectures easy to attend. Many special thanks go to my presentation colleague, Dr. Bahaa for his excellent co-operation and supports during this thesis preparation. I would also like to thank colleague hydrogeologists from the JMG, namely En.Muhamad Yusof bin Che Sulaiman and to Dr.Saim Suratman and En.Ismail Tawnie from NAHRIM, for their help in getting related data and information from previous field works and historical databanks. Special thanks to General Manager of Air Kelantan Sdn.Bhd., En. Mohd Suhaimi bin Mohd Jusoh and staffs of Air Kelantan Sdn.Bhd., for giving the time and space during the preparations of this thesis, without which, the office workloads will definitely hamper the progress of the study. Warmest thanks to my dearest wife, Wan

Aishah and my children being the supporter and for their constructive advices during the long hours in preparing this thesis.

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LIST OF ABBREVIATIONS

AKSB	-	AIR KELANTAN SDN.BHD.
JMG	-	JABATAN MINERAL DAN GEOSAINS, MALAYSIA (MINERALS AND GEOSCIENCE DEPARTMENT MALAYSIA)
JPS	-	JABATAN PENGAIRAN DAN SALIRAN MALAYSIA (DEPARTMENT OF IRRIGATION AND DRAINAGE MALAYSIA)
JKR	-	JABATAN KERJA RAYA (PUBLIC WORKS DEPARTMENT)
NAHRIM	-	NATIONAL HYDRAULIC RESEARCH INSTITUTE OF MALAYSIA
JANK	-	JABATAN AIR NEGERI KELANTAN
DOE	-	DEPARTMENT OF ENVIRONMENT MALAYSIA
GIS	-	GEOGRAPHICAL INFORMATION SYSTEM
GWRM	-	GROUNDWATER RESOURCE MANAGEMENT SYSTEM

SCADA - SUPERVISORY CONTROL AND DATA
ACQUISITION

MI/d - MILLION LITERS PER DAY

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